AMRDEC Technology As It Pertains To the Global War on Terror

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US ARMY AMRDEC

Systems & Warheads

39th Annual Gun & Ammunition / Missiles & Rockets Conference & Exhibition

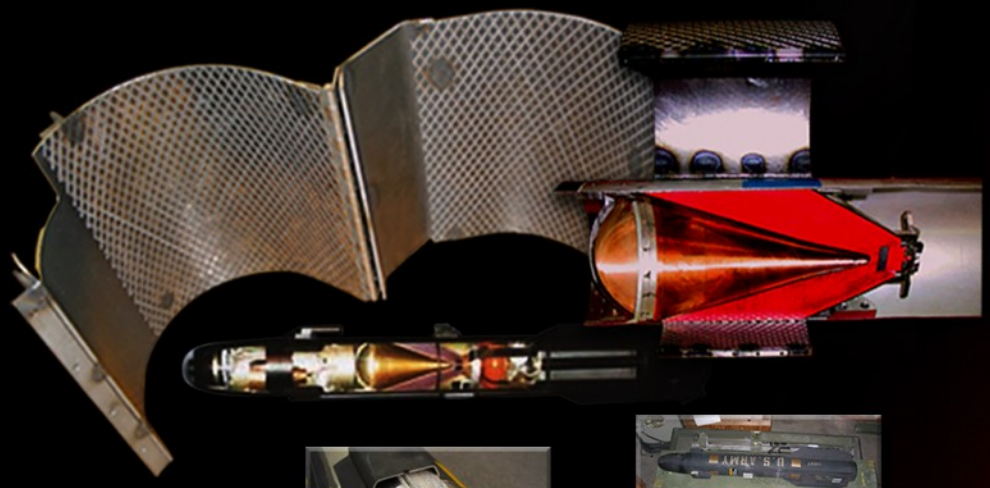
Introduction

AMRDEC Support of Global War on Terror

- **Hellfire Mod-K Program**
- **Advanced Precision Kill Weapon System (APKWS)**
- **TOW Bunker Buster**

AMRDEC

HELLFIRE K MODEL MODIFICATION



HELLFIRE AGM-114K

"MOD-K"

HELLFIRE Mod-K

Objective: Develop a Fragmentation Sleeve for Hellfire II Missile to Meet Urgent Operational Necessity

Baseline HELLFIRE II | Mod-K Fragment Sleeve

- **Development Concept**
  - External Modification to Current Fielded Missile System
  - Ability to Modify Missiles and Containers in Field Locations
  - Minimize Logistics Impact
  - Ability to Ship Modified Missiles
  - Field in Four Months

Successful Fielding Resulted in Continuing Requests

Purpose of the Program

- Add An Anti-Personnel / Anti-Material Capability for Hellfire Missile System
  - Optimize Fragment Lethality Against Broad Range of Targets
  - Minimize Shaped Charge Performance Degradation
  - Meet Urgent Operational Necessity
  - Mission Capable – Limited Qualification

Elements of Design

- Sleeve Design
  - Attachment / Hing
  - Fragment Size an Material
  - Internal Scoring
  - Adhesive
  - Missile Integration
- Adapt Shipping Container to Accommodate Missile Sleeve

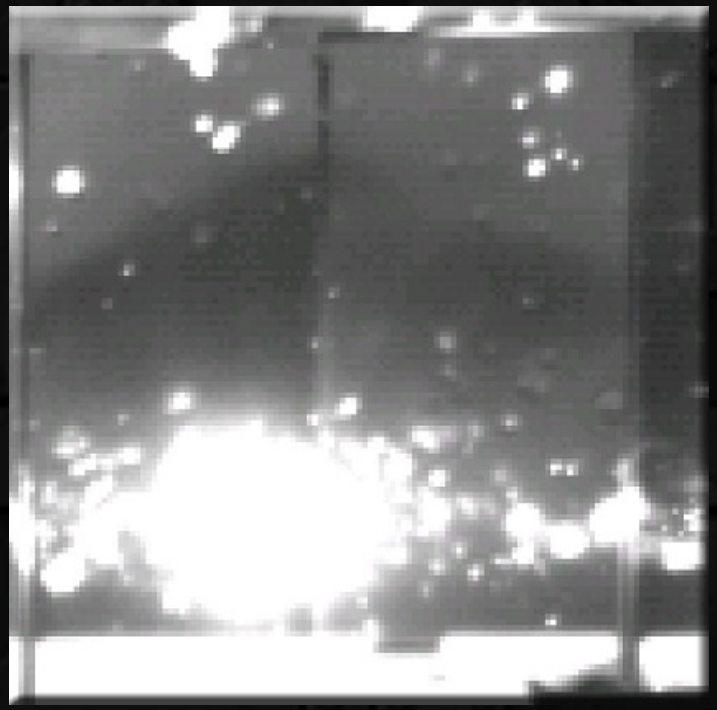
Comparison of Baseline Missile & Steel Sleeve Fragmentation

Baseline Hellfire II

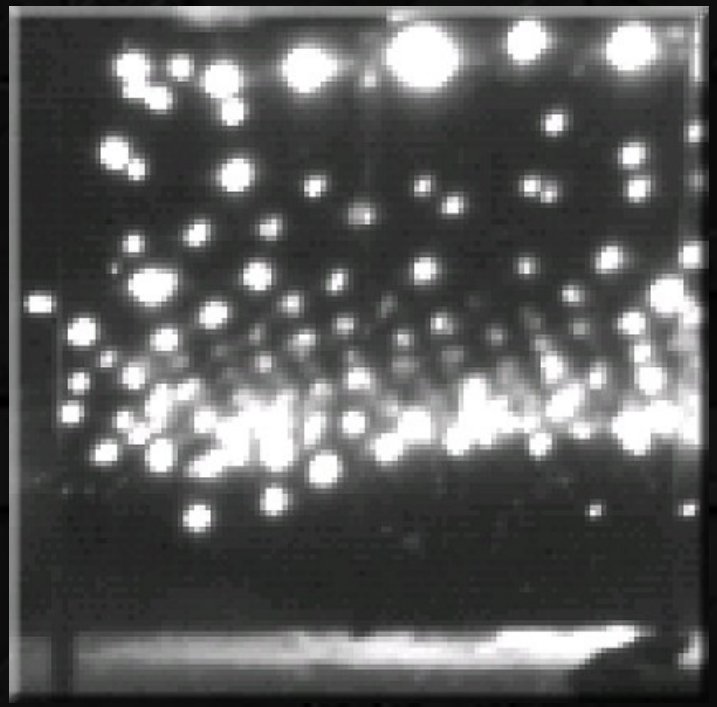
Mod-K Fragment Sleeve

Comparison of Baseline Missile & Steel Sleeve Fragmentation

Baseline Hellfire II



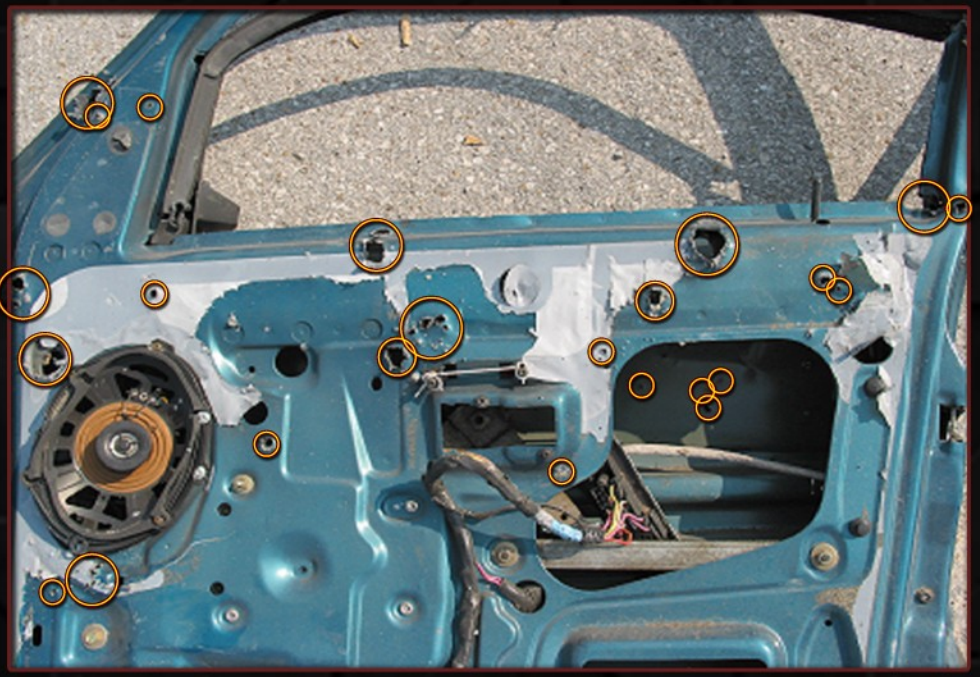
Mod-K Fragment Sleeve



SUV Door Penetration

Multiple External Perforations

Several Internal Perforations



Flight Test Results

- No Launch Rai
  Interference
- Aerodynamics
  Proven
- Flight Stability
  Proven
- Hit Accuracy Not

Mod-K Conclusions

- Significant Increase in Number of Lethal Fragments
- Provides Capability Against Personnel and Light Vehicle Targets
- Sleeve Design Has Minimal Effect on RHA Penetration
- Fragment Sleeve Expands the Role of HF Missile for Targets of Opportunity

APKWS

Block I: Precision Guidance for 2.75” rockets

Block II: Warhead & Fuze Development

BLOCK I OBJECTIVES

Develop, flight demonstrate, and integrate onto the AH-64 APACHE a low cost, accurate 2.75 inch guided rocket that provides a standoff range surgical strike capability against specified soft point targets.

Provides precision strike capability to HYDRA-70 rockets

Supports APKWS SDD Start

Requirements Summary

- Hydra-70 range (1-6Km)
- HELLFIRE-like accuracy (~1m)
- Reduced fratricide (accuracy)
- Enhanced survivability (standoff)
- Reduced cost/kill (2x to 4x)
- Increased stowed kills (4x to 20x)
- Reduced collateral damage (>2x)
- Minimize platform mods (screw-on kit)
- Current logistics (screw-on kit)

MNS APPROVED 02/96
ORD APPROVED 03/00

Expanded Target Set

MOUT / Non-Hardened Field Structures

MANPADS

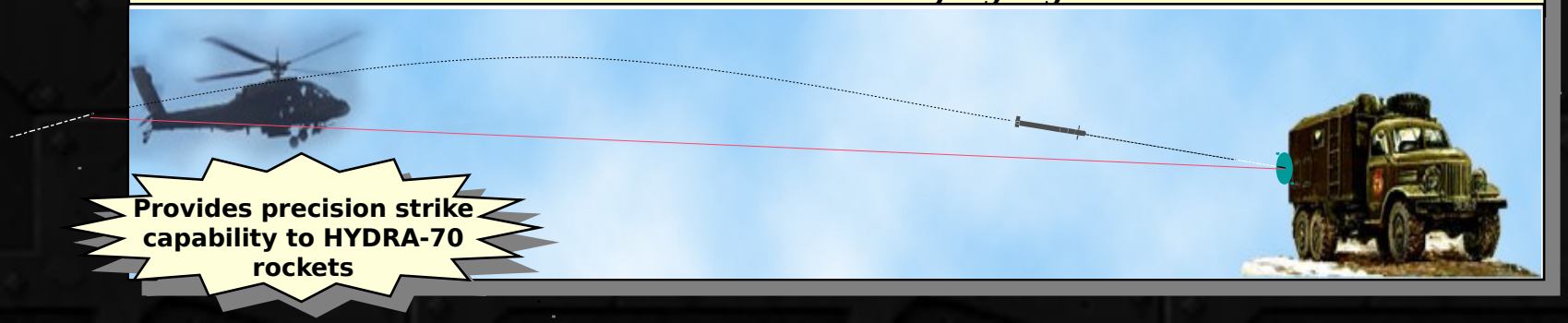
Truck

IFV

TECHNICAL APPROACH

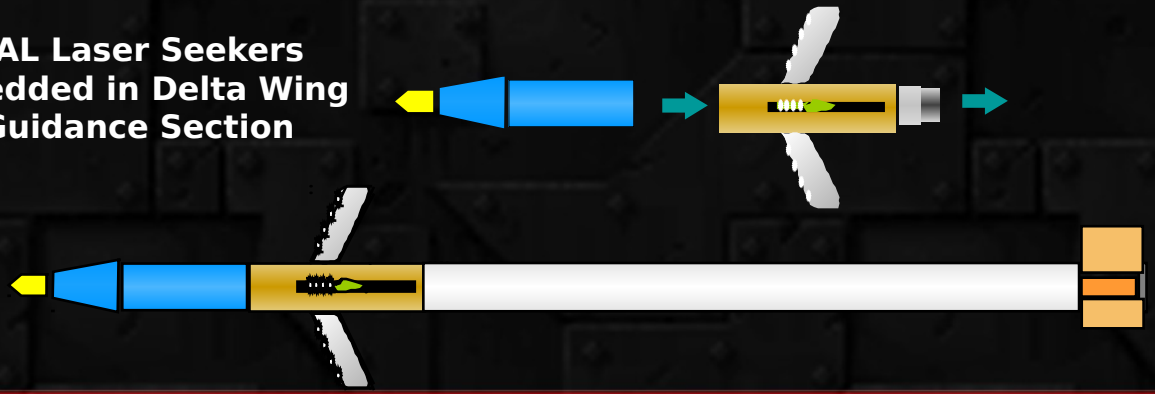
Semi-Active Laser (SAL) Lock On After Launch (LOAL)

Engagement of individual targets with high probability of single shot hit requires terminal or command to line-of-sight guidance.



BASELINE HYDRA-70 ROCKET

SAL Laser Seekers Inbedded in Delta Wing Guidance Section

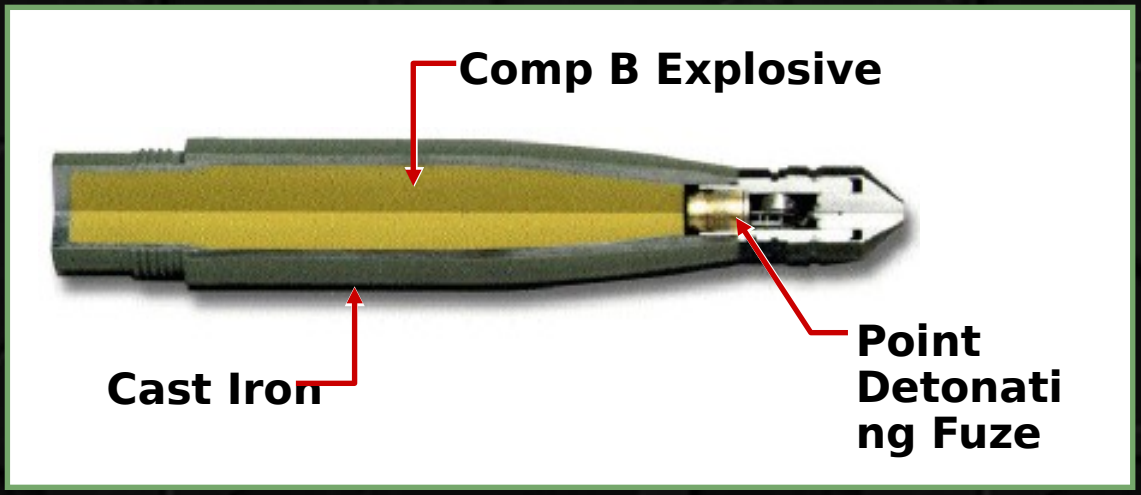


Proposed APKWS Block II Objectives

Integrate Technologies to Replace the Current M151 and M423

- **Insensitive Munition Compliance Is Main Focus**
- **Improved Warhead and Fuze Lethality**
- **Improved MIL-STD 1316 Fuze**
- **Program Ends in FY05 with TRL 6 Prototype Designs and Supporting Test Data**
- **Low Risk Transition to APKWS Block II SDD in FY06**

M151 Warhead Description



Current Design

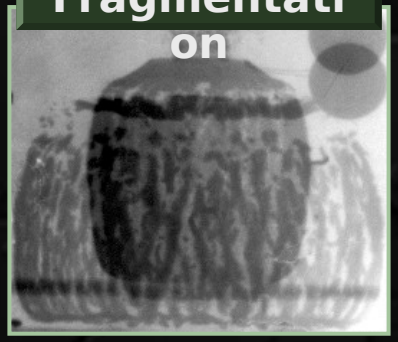
- Designed 40 Years Ago
- 65% of Fragments less than 5 grains
- Narrow Spray of Fragments
- Impact Fuze

Potential Improvements

- Improved Fragmentation
- More Efficient Case Shape
- Enhance Blast Explosives
- Delay Fuzing for MOUT Targets

Fragmentation Technology

Natural Fragmentation



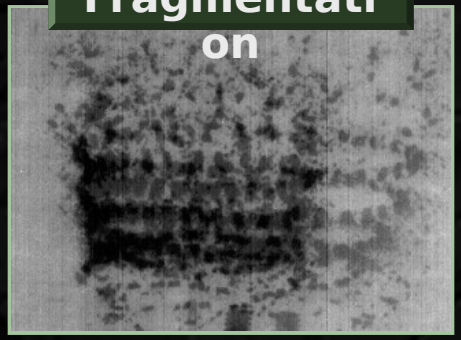
Wasted Mass/Energy

Least Cost

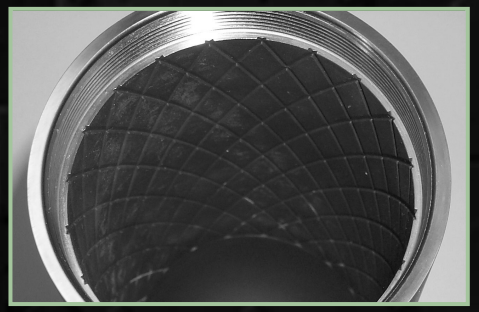
Least Efficient

M151 Warhead

Embossed Fragmentation

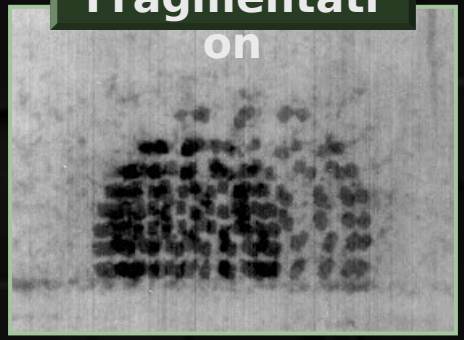


Less Wasted Mass/Energy
Improved Lethality, Low Cost



Pearson or V-Notch Scoring

Preformed Fragmentation



Efficient Mass/Energy
Optimized Lethality, More Cost

Most Cost

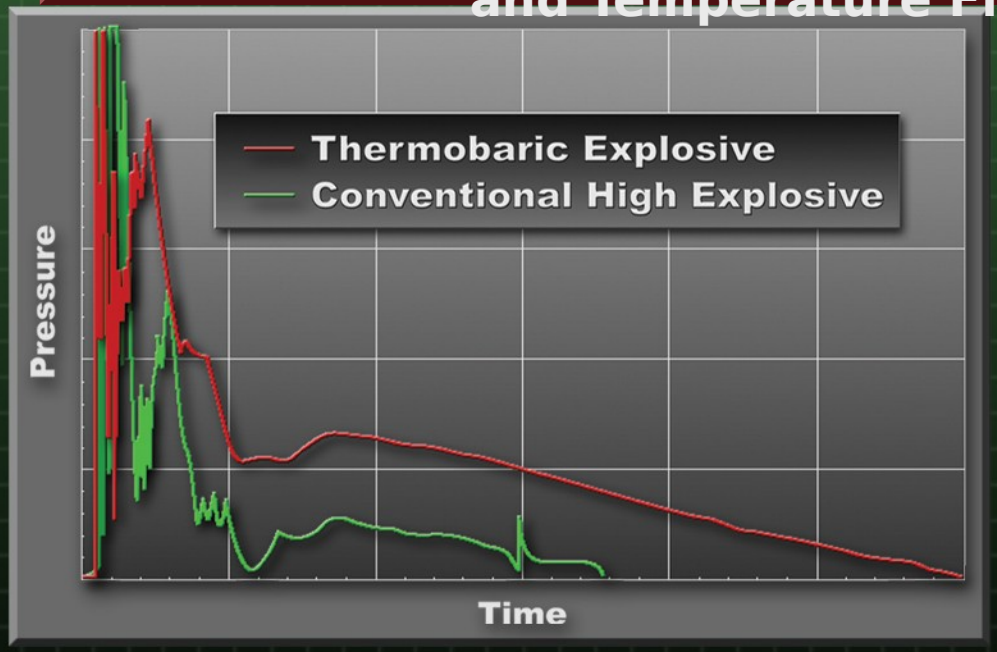
Most Efficient

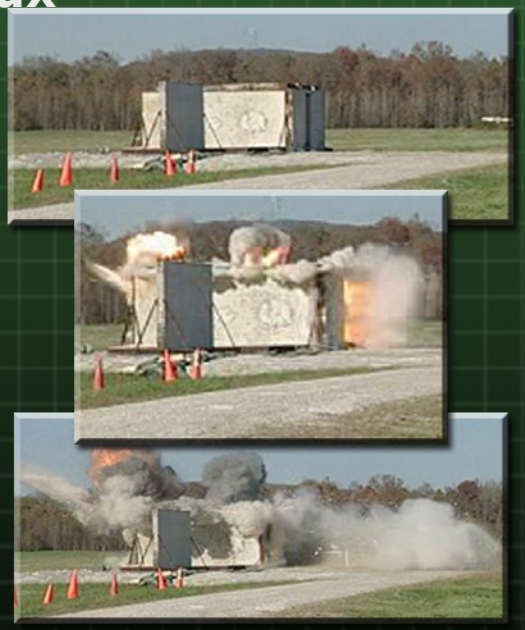
Tungsten fragments

Optimization Balances Cost and Performance

Effects of Enhanced Blast

We Want to Manage the Energy Release of the Explosive in Order to Maximize the Blast Impulse and Temperature Flux





Many Structures Survive High Load, Short Duration, Blast

Increased Impulse (Pressure Over Time) Causes Greater

Features of the APKWS Block II Fuze

- Integrated Development With Block II Warhead
- Meet Applicable Safety Standards (i.e., Dual Safe)
- Fuze May Include These Modes:
  - Point Detonating
  - Delay Detonating

Lethality Drives the Fuze Requirement

APKWS Program Summary

- Design for IM
- Enhanced Fragmentation
- Enhanced Blast
- Dual Safe Fuze

Next Step: **APKWS Block II Warhead and Fuze Program Will Provide the Capability to Defeat the Current and Evolving Threat**

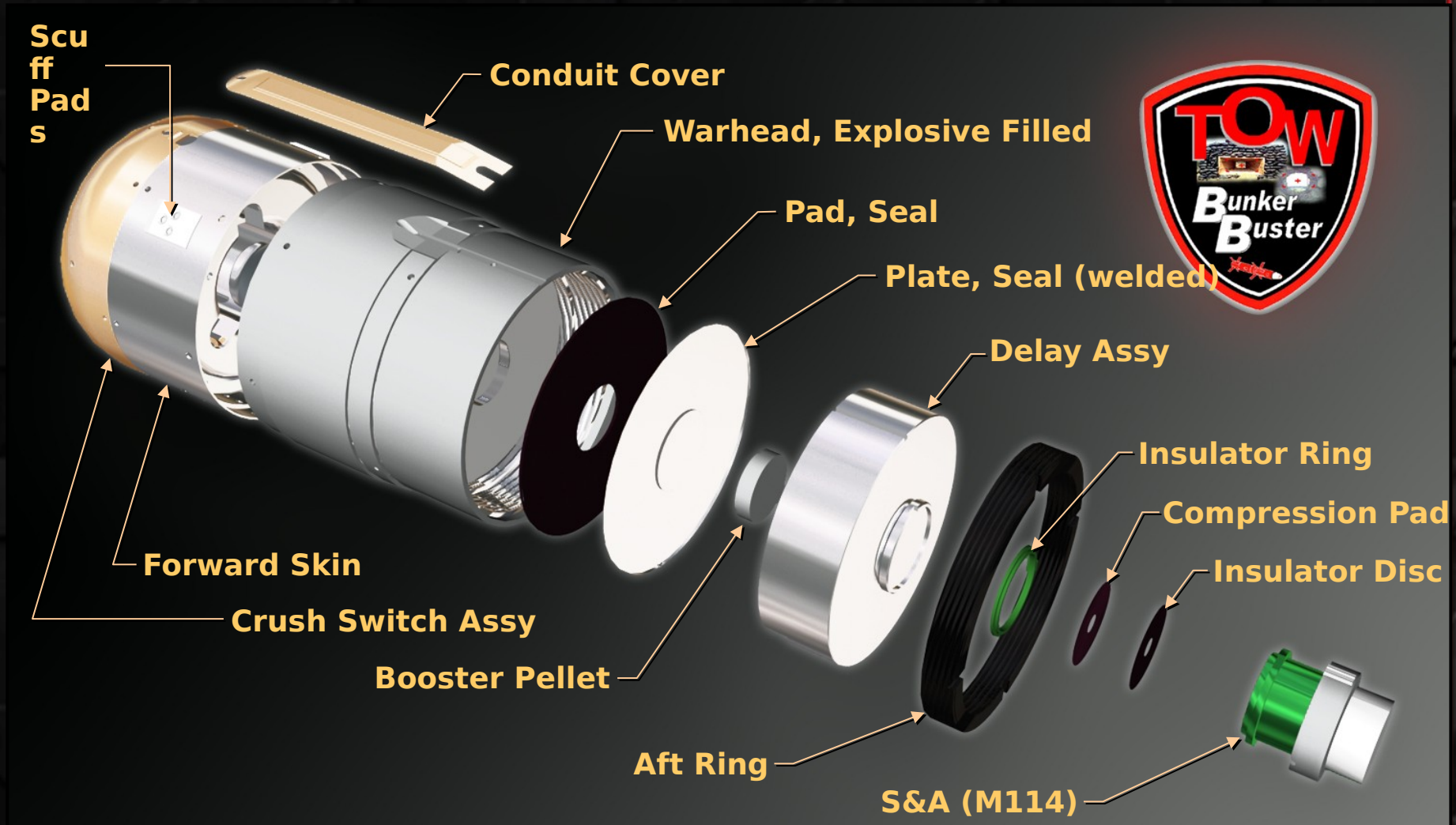
TOW Bunker Buster

Objective: Provide Stryker ATGM with capability to breach masonry walls and defeat bunkers until Mobile Gun System becomes available.

- **Systems & Warheads Led Effort**
  - 12 Months R&D
  - 3 Months Production
- **Development Concept**
  - Designed Warhead
  - Missile Integration/ Retrofit
  - Warhead and Missile Test
  - Hardware Fabrication
  - Developed TDP
  - Led Production Effort

500 Missiles Delivered on Schedule and Within Budget

TOW BB Warhead



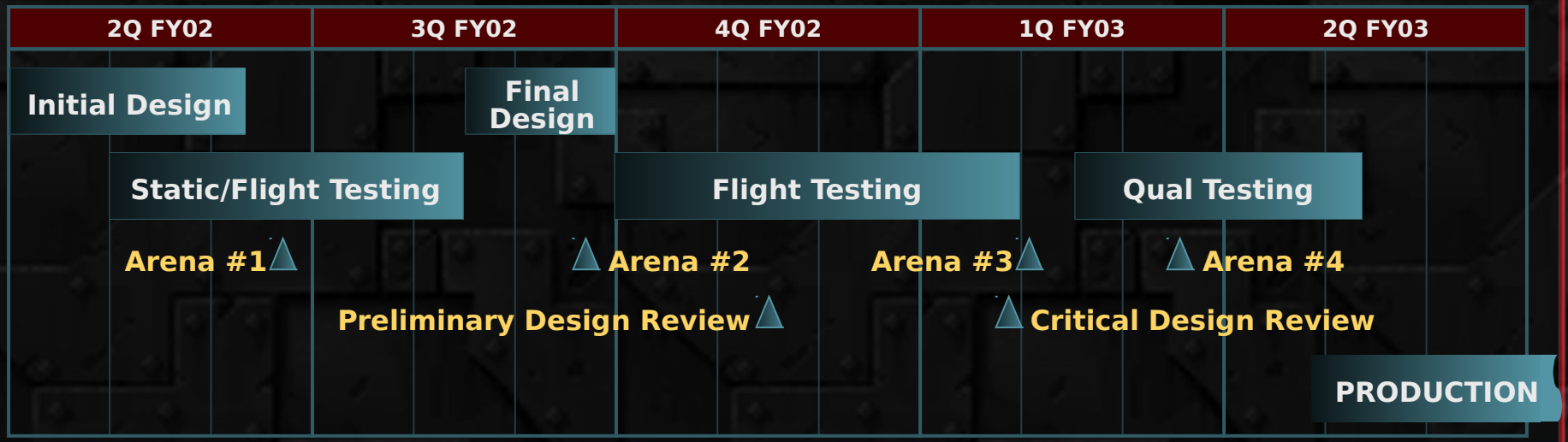
TOW Bunker Buster

Major Accomplishments

- Designed HE Bulk Charge Warhead
- Designed Fuze Delay Assembly
- Integration Resulted in Negligible Effects on Flight Performance
- Testing and Qualification
- Production Completed by May 03

Opportunity

- Thermobaric Variant



TOW Bunker Buster – Wall Engagement

TOW Bunker Buster – Building Engagement

TOW Bunker Buster Program Summary

- Quick Reaction Program
  - 12 Months R&D
  - 3 Months Limited Production at Army Depot

- Currently Fielded for Stryker Brigade
  - 500 Missiles

- Primary Mission to Support MOUT Wall Breaching

AMRDEC Support to Global War On Terror

- **Expertise With Army Precision Guided Missiles Enables Quick Reaction Modifications to Support Unique and Urgent Mission Requirements**

- **Prototype and Limited Production Capability**

- **Working Relationship with All Missile Prime Contractors and Other Stakeholders**

TOW Bunker Buster – Bunker Engagement